1880

BOROUGH OF CARDIFF

REPORT

ON THE

Sanitary Condition of Cardiff,

FOR THE YEAR 1879,

BY

H. J. PAINE, M.D., M.R.C.S., &c., &c.,

MEDICAL OFFICER OF HEALTH,

HONORARY MEMBER OF THE EPIDEMIOLOGICAL SOCIETY, EXRTA URBAN MEMBER OF THE METROPOLITAN ASSOCIATION OF OFFICERS OF HEALTH.

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MEDICAL OFFICER'S REPORT.

Cardiff, February 1880.

To the Cardiff Urban Sanitary Authority.

GENTLEMEN,

The Sanitary condition of the Urban District of Cardiff during the year 1879 contrasts very favourably with the Kingdom generally, but especially with that of the 22 typical large towns enumerated by the Registrar-General; and while a very careful supervision has been maintained throughout the year it is satisfactory to know that fewer local excitant causes of disease have been observed. The direct and collateral causes calculated to influence the public health may be summarised as under:—

THE METEOROLOGY.

The Weather during 1879 may be said to have been exceptional. The winter months of January, February and March in the beginning, and November and December in the end of the year, were marked on each occasion by long and almost continuous frosts, with strong winds prevailing from the N.E. and East. As a consequence, in the monthly reports I made to your Board at these times, I directed your attention to an excessive mortality due to acute inflammatory diseases of the internal viscera, especially those of the respiratory organs, and I attributed this mortality to the following causes.

The low range of temperature which, more or less prevailed throughout the whole of the Spring, Summer and Autumn months, the absence of sun, with the excessive duration of wet weather in the months of June, July, August and September, produced a very bad harvest, and a fruit crop deficient both in quantity and quality; but while these causes operated so unfavourably upon vegetation, they did not seem to prejudice the human economy, as at this time a very low rate of mortality ruled the district,—the monthly death-rate on two occasions being as low as 10 and 11 per 1,000 inhabitants respectively.

The detailed Meteorological Observations were as follows:—

The Rainfall of 1879 was carefully taken by Mr. W. Adams, C.E., F.G.S., at his residence, Cambridge House, Park Place, Cardiff, and is shewn by the subjoined table:—

Latitude, N. 51deg., 9min. 10sec.
Longitude, W. 3deg. 9 min. 55 sec.
Diameter of Receiver of Guage, 5 inches.
Height above ground, 1 foot.
Height above sea-level, 43 feet.

Month.	Depth.	Greatest fall in 24 hours.		Days on which ·01 inch or more fell.
		Depth.	Date.	
January	4·71	1·30	1st	10
February ...	5·95	0·86	20th	23
March	1·14	0·32	23rd	14
April	2·64	0·73	19th	17
May	2·85	0·88	29th	15
June	6·48	1·64	30th	23
July	4·00	0·81	19th	21
August	8·12	1·34	27th	22
September ...	4·85	0·69	7th	17
October	1·51	0·35	19th	12
November ...	0·43	0·18	20th	8
December ...	2·11	0·79	31st	9
Total ...	44·79			191

The total Rainfall in 1879 was 1·24inch above the average of the previous six years, as shewn by the following table :—

Month.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
January	4·76	4·63	5·87	1·91	5·77	1·73	4·71
February ...	1·17	2·91	2·08	5·33	2·79	3·07	5 95
March.....	3·60	2·03	1·66	3·92	2·66	1·25	1·14
April	0·39	1·67	2·65	2·70	2·90	4·10	2·64
May	2·72	0·67	2·93	0·23	2·47	4·32	2·85
June	1·93	1·71	5·34	1·91	1·48	3·68	6·48
July	4·03	1·78	6·27	1·24	4·94	2·01	4·00
August	3·66	4·57	3·82	6·06	5·70	10·82	8·12
September ...	2·75	5·45	4·05	7·08	3·25	3·21	4·85
October	4·42	4·83	7·80	3·84	4·89	5·76	1·51
November ...	2·29	2·71	7·78	5·27	6·54	3·06	0·43
December ...	1·16	4·35	1·74	7·13	3·40	2·70	2·11
	32·88	37·31	51·99	46·62	46·79	45·71	44·79

The monthly Meteorological details were :—

January was a cold and very trying month, with sharp frosts on 25 days. The prevailing wind was N.E. The barometer stood at its highest point—30·328in. on the 27th, and the lowest 29·374in. on the 3rd, giving a range of 0·954in. The mean for the month was 29·954in. The temperature was much below the average, the maximum temperature in the shade registered 49·3deg. on the 14th ; the minimum registered 17·6deg. on the 12th ; the range was 31·7deg. The Thermometer was below 32deg. on 25 days. The mean of the maximum temperature was 37·2deg., the mean of the minimum 28·7deg. From observations of aqueous vapour, the mean of Hygrometer.dry bulb reading was 32·1deg., of wet bulb 31·5 deg. The Rainfall was 4·71in., and fell on 10 days.

February had weather of a mixed character—frost and rain alternated. N.E. winds again prevailed. The barometer was low, it stood at 30·084in. on the 26th, 28·902 on the 10th ; the range 1·182in. The mean height for the month was 29·475in. The temperature showed a maximum of 53·2deg. on the 9th, and minimum on the 23rd of 24·8deg. ; the range was 28·4deg. ; mean of the highest readings 44·8deg., and of the lowest 34·5deg. ; it was at or below 32deg. on 11 days. The Hygrometric indications were, mean of dry bulb

38·5deg., wet bulb 37·8deg. The Rainfall was 5·95in., extending over 23 days.

March was a drier month, with frosts on several days. Cold North winds preponderated. The barometer was at its highest point 30·418in. on the 8th, and lowest 29·518deg. on the 27th ; the range was 0·900in. The highest temperature was 60deg. on the 19th, and the lowest 28·4deg. on the 2nd ; range 31·6deg. ; the mean of the maximum readings was 49·4deg., minimum 36·2deg. The Thermometer was at or below 32deg. on 5 days. The Hygrometric indications were, mean of dry bulb 41·7deg., wet bulb 40·1deg. The Rainfall measured 1·14in., and fell on 14 days.

April was cold and somewhat dry. Easterly winds prevailed. The barometer was low—the highest point attained 30·299in. on the 29th, the lowest 28·820in. on the 7th ; the range was 1·479in. ; the mean of the month 29·657in. The highest temperature 62deg. occurred on the 27th, and the lowest 30deg. on the 12th ; the range 32deg. ; the mean of the maximum temperature 53·5deg., the mean of the minimum 38·1deg. The Thermometer was at or below 32deg. on 4 days. The Hygrometric readings were, dry bulb mean 45·6deg., mean of the wet bulb 43·3deg. The Rainfall was 2·96in., extending over 17 days.

May was also cold, with a predominance of N.E. winds. The barometer was high and touched 30·732in. on the 9th, and 29·491in. on the 28th ; range 1·241in. ; the mean height was 29·988in. The greatest heat was on the 21st, when the thermometer registered 66deg., and the lowest 31·4deg. on the 3rd ; the range was 34·6deg. ; the mean of the maximum readings was 59·4deg., of minimum 43deg. The Thermometer was at or below 32deg. on 2 days. The Hygrometer showed less humidity, mean of dry bulb 52·2deg., wet bulb 48deg. The Rainfall was 2·85in., falling on 15 days.

June was very wet and gloomy, there was a marked prevelance of S.W. Winds. The highest barometric pressure was 30·075in. on the 13th, and the lowest 29·397in. on the 17th. The range 0·678in., and the mean reading for the month 29·706in. The greatest heat was 69deg. on the 13th, and the lowest 41·2deg. on the 4th. The range was 27·8deg. The mean of the maximum temperature was 64·3deg., and of minimum 50·7deg. The mean Hygrometric readings were, dry bulb 60.8deg., and wet bulb 55·2deg. The Rainfall was heavy, and amounted to 6·48in. distributed over 23 days.

July was a wet month, harsh, and ungenial, N.W. Winds preponderated. The barometer was unsteady, the highest point attained

was 30·260in. on the 24th, and the lowest 29·259 on the 1st. The range 1·001in., the mean reading 29·748. The highest reading of the thermometer was 78·2deg. on the 29th, of the lowest 45·4deg. on the 11th. The range 32·8deg. The mean of the maximum temperature was 65.4deg.; minimum 53·1deg. The mean heat of the month was much below the average. The Hygrometric mean readings were, dry bulb 58·4deg., wet bulb 57deg. The Rainfall was 4·00in., and extended over 21 days.

August was cold and wet, S.W. Winds prevailed. The Barometer was low and oscillated considerably. The greatest height observed was 30·126 on the 10th, and the lowest 29·399 on the 28th. The range 0·727in., the mean was 29·776in. The highest temperature registered was 72·4deg. on the 15th, and the lowest 46·2deg. on the 30th; the range 26·2deg. The mean of the maximum was 66·4deg., minimum 53·9deg. The mean of the month was below the average. The Hygrometric mean readings were dry bulb 60deg., and wet bulb 58deg. The Rainfall was heavy 8·12in., and it fell on 22 days.

September commenced with a few fine days, Winds from the S.W. preponderated. The Barometer was higher and oscillated less widely. The highest reading touched 30·405 on the 1st, the lowest 29·397 on the 24th. The range 1·008, mean height 29·919. The highest temperature was 67deg. on the 6th, the lowest 39·5 on the 1st. The range 27·5deg. The mean of maximum temperature was 62deg., and of the minimum 49·6deg. The mean of the month was again below the average. The Hygrometric mean readings were, dry bulb 56·2deg., wet bulb 54·8deg. The Rainfall measured 4·85in., distributed over 17 days.

October was characterised by a great dimunition of moisture, and the weather wore a brighter aspect. Drying winds from the N.E. prevailed. The Barometer showed increased and steadier atmospheric pressure, the greatest height was 30·495 on the 12th, the lowest 29·398 on the 20th. The range 1·097in., mean reading 30·082in. The maximum temperature registered was 63·5deg. on the 6th, the minimum 30·4deg. on the 16th, the range 33·1deg. The mean of maximum was 55·2deg., minimum 44·6deg. The mean of the month was again below the average. The Hygrometric mean readings were dry bulb 49·6deg., wet bulb 48·5deg. The Rainfall was 1·51in., and fell on 12 days.

November was dry and cold. The predominant Winds were N.E. The Barometer was very high, its highest point was 30·571in. on the 7th, its lowest 29·794 on the 21st. The range 0·777. Mean height 30·210in. The maximum temperature was 60·4deg. on the 18th,

the lowest 24·2 on the 30th. The range 36·2deg. Mean of the maximum 46·5deg., minimum 36·2deg. The mean of the month was under the average. The Hygrometric mean readings were, dry bulb 40·1deg., wet bulb 39·1deg. The Rainfall was very light, being only 0·43in., and fell on 8 days.

December was extremely cold, Winds from the N.E. prevailed. The Barometer was exceptionally high, and reached its maximum height 30·715 on the 13th, and the lowest limit 29·567 on the 4th The range was 1·148in. The mean altitude was 30·270in. The highest temperature was 52·8deg. on the 28th, the lowest 19·2deg. on the 7th, showing a range of 33·6deg. Mean of maximum temperature 39·6deg., minimum 28·5deg. The mean of the month was much below the average. The Hygrometric mean readings were dry bulb 33·1deg., wet bulb 32·3deg. The Rainfall was 2·11in., and fell on 9 days.

DRAINAGE.

In the reports made to your Board for the years 1877 and 1878, I detailed at some length the main trunk sewerage of the sub-districts of Cardiff and Canton. At the end of the latter year these systems may be said to have been completed, and the construction of sewers limited to the increased requirements of the district as new streets were formed. The additional construction of sewers were as follows :—

WESTERN DISTRICT :

A sewer in the Mortimore Road, size, 3ft. 3in. by 2ft., inclination 1 in 370 ; another in William Street, size, 3ft. 3in. by 2ft., inclination 1 in 200 ; one in Pontcanna Place, size, 3ft. 3in. by 2ft., inclination 1 in 75 ; one in Halket Street, size, 3ft. 3in. by 2ft., inclination 1 in 86.

CENTRAL DISTRICT :

A storm overflow sewer in Patrick Street to relieve that in Bute Lane, and to prevent the flooding of cellars and basements in Loudoun Square. The object sought to be attained by this extra sewer has been most successful. Since its construction no complaints of flooding in the basements or cellars belonging to houses in Loudoun Square have been made.

An intercepting sewer extending from the main outfall sewer near the Bute Gas Works on the East Moors, passing through Gwendoline Street, thence under the Great Western Railway, through Cycle

Street, Constellation Street, Moira Street, and crossing the main road near the old cemetery, up to which point it is now completed. It is intended to communicate with the main trunk sewer in the Newport Road, near the Infirmary. This new sewer is important, as it is intended to intercept all the sewage and storm water of the whole of the Northern and Eastern portion of the Central District, having an area of 700 acres, and thus get rid of a serious evil to which it had been heretofore subjected. A storm outfall sewer has been constructed at Stuart Street for the purpose of relieving the existing system of sewers in the neighbourhood of Bute Town (which has an area of some 50 acres) on occasions of heavy and sudden downpour of rain, by affording an independent and self-acting exit into the sea for all storm water. It is contemplated that it will effectually relieve the sewers, thus preventing the flooding of basements and cellars of houses in this locality, except on rare occasions when high spring tides occur in conjunction with very heavy and continuous rain.

The following Streets in the Western District are at present without deep sewers for house drainage, and cesspools are still in existence, viz. :—Wellington Street, Edward Street, Picton Place, East Street, Mary Ann Street, Thomas Street, and North Morgan Street.

The necessary plans and sections have been prepared for the sewerage of these streets, and will doubtless receive your early attention.

Your main trunk systems of drainage with their collateral branches act efficiently, but it should be urgently insisted that in all future house plans the soil pipes leading from the water closets should immediately pass to the outside of the building, and thus prevent an escape of sewer gas into the interior of the dwelling, which has not unfrequently happened through the defective construction of the soil pipe. Sewer gas has from time to time been the fatal cause of disease, as will be noticed again when speaking of the mortality of the district. It is also highly desirable that an external ventilating shaft should be required from this pipe and carried to the highest point of the house, best to the top of the chimney, and not terminating as heretofore just above the eaves. The foul gases escaping from these pipes may be cooled (if the pipes are not sufficiently high) after nightfall and travel downwards, and in this manner find their way into the bedrooms.

WATER SUPPLY.

During the past year 16 samples of well water from various districts of the Borough have been submitted to Mr. Thomas for

examination. Proceedings were taken with a view to prevent these waters being used for dietetic purposes, and as the result sixteen wells were ordered to be permanently closed.

I have had occasion to notice that some special characteristics possessed by these waters, discovered during their analysis, coincided with other facts elicited by me in connection with the health of those drinking the water, and I am more than ever confident that the closing of those wells—showing undeniable evidence of sewage contamination—has led to beneficial results.

The grounds upon which these waters were regarded as impure and dangerous to the health of persons drinking them, were very similar to those which I have pointed out in my previous reports. The *total solid matter* was generally very high, and the constituent elements were of such a character as to leave no doubt that the soakage from sewers, &c., formed a large portion of the well water. This was further borne out by the evidence of sewage contamination, furnished by the oxidation products of nitrogenous animal matters, which were present in considerable quantity. The fact that chlorine, chiefly in combination, as common salt, formed so appreciable a proportion of the mineral constituents of the waters when the substrata removed from sewage influence contained it only in normal quantity, is additional confirmation. In short, no evidence was wanting to prove beyond suspicion that the closing of these wells was necessary as a safeguard for the health of those who used the water for dietetic purposes. A few of the analyses are appended in the accompanying table, in order to show the typical character of the well waters.

In my previous reports I have dealt somewhat lengthily, and fully, upon various points connected with the water supply of this Borough. I have entered discursively into the character, sources, and quality, of the water which forms the public supply of the town, and pointed out the general characteristics of good and impure water. That yielded by the substrata under Cardiff has also been referred to, and numerous considerations respecting the sources, nature, and extent, of the pollution have been contemplated. I have, furthermore, dwelt upon the sanitary bearing which impure water has upon the health of the community, and in this report I shall confine myself to two special points.

1. The public daily supply of water per head of population and collateral circumstances connected therewith.

2. Some remarks upon contaminated water and the spread of infectious disease.

With regard to the public supply of water I have ascertained the storage capacity of the Llanishen Reservoir, and found it to be 80,000,000 gallons. The daily distribution of water from this source is 1,500,000 gallons. This storage, therefore, is equivalent to some 50 days' supply, apart from any water which may continue to run in during dry weather. The quantity of water which finds its way into the Reservoir is not restricted, altogether, to that derived from the rainfall upon the land forming the gathering ground of the supply, and during dry weather, even, no inconsiderable quantity from permanent springs gain access to the Reservoir. Under these circumstances, as long as one-and-a-half million gallons only are distributed it is possible that during any ordinary drought no serious scarcity of water would be experienced, and the storage capacity may be ample under existing conditions. The first question which arises is, however, as to the sufficiency of this daily distribution for present requirements. Taking the population of Cardiff and Penarth at 87,000, only 17¼ gallons per head would be available, but at the present time some 500,000 gallons per diem are pumped up from the Ely filtering beds, making altogether 2,000,000 gallons, or 23 gallons per head of population.

I have pointed out on a previous occasion the inferior quality and danger of pollution to which the Ely water is liable, and expressed an opinion upon the undesirability of increasing the facilities for obtaining more water in that locality.

It appears that the main leading from the filtering beds at Llanishen is not capable of conveying more than 1,500,000 gallons per day, hence with present accommodation an additional volume of water cannot be obtained from the Llanishen source. The number of gallons per head supplied is by no means excessive, and in the face of an increase of population, at the rate of 5,000 per annum, some additional provision will have to be made soon as time will elapse during the construction of the necessary works. In the majority of large towns the daily distribution of water reaches 30 gallons per head, which is the extent of the London supply. This includes all the water used for flushing drains and general sanitary purposes, whilst in Cardiff some of the flushing is done with water other than that drawn from the public supply.

Not unfrequently, during proceedings for the closing of wells, two questions relating to the character of water as an agent for spreading infectious disease have cropped up; and, as these at first thought are plausible and misleading, I have considered it well to make reference thereto. They are these: 1. If the water is contaminated with

sewage, how is it that it has been drank for so long a period without spreading disease before? 2. If the water is so filtered as to be free from excess of organic matter, how can there be anything present that will give rise to disease? The public are rather apt to credit that if a water is clear, tasteless and inodorous, the quality is all that can be desired, and that it must, as a matter of course, be a good water. Without going over ground, which I have covered in other reports, I will simply confine my remarks to the answering of the above questions, as I believe these will render apparent why it is that a clear, tasteless and inodorous water may be nevertheless dangerous to health.

It has been established beyond doubt that the excrementitious matter of patients suffering from infectious disease contain germs which are characteristic of those diseases. When sewage containing these germs finds its way into potable water the disease manifests itself in those who drink of the water, and in this manner an epidemic may spread over a wide area. When there are chemical compounds present in a water, which show that it consists largely of the soakage from sewers, &c., that water is dangerous to the health of persons drinking it; but if the filtration is perfect it may be drank with impunity for years, provided no epidemic disease has occurred. If, however, disease of this character were imported, or broke out, and the soakage from the drains, conveying this infected sewage, gained access to a well, then the persons who drank this water would be liable to take the disease also.

It may be asked, as it often is, "but would not the filtration power of the subsoil which removed the organic matter from the water also remove the germs of disease?" No, and herein lies the fact that a clear, colourless and inodorous water may withal be a dangerous one. It has been proved repeatedly that filtration does not remove the infectious properties possessed by sewage containing the excrementitious matter of persons suffering from zymotic disease, and further, by reason of their minuteness and subtle character neither chemical nor microscopical analysis is capable of detecting the germs or specific poison. The oxidation products of sewage or animal matters—nitrates and nitrites—afford a good means, together with other evidence, of ascertaining the previous history of a water, and of discovering if sewage was at any time mixed with it. Sanderson, Chanveau, Burdon, and others have shown, very ably, the apparent certainty which exists that the specific poisons of zymotic diseases are organised and living organic matters, and, as such, are less subject to be destroyed by any oxidation powers which a subsoil may possess. While, therefore, a water may be so free from organic matter, through

filtration and oxidation, as to give evidence of *purity in this respect*, yet the small quantity which remains may consist actually of the organised and highly subtle germs of infectious disease, which, by reason of their vital character, may have resisted oxidation. An instance, quoted by Dr. Frankland in the 6th Report of the Commission, on the pollution of rivers, is very interesting and striking, as illustrating the foregoing: "The village of Lausen, in Switzerland, hitherto noted for its immunity from zymotic disease, was suddenly attacked with typhoid fever—no less than 130 out of the 780 inhabitants having been subjected to its influence. The curious circumstance that six families obtaining water from their own private wells were exempt, led to the suspicion that the public supply was connected with the cause of the epidemic. As the supply was taken from a spring in the side of a mountain, and carefully protected afterwards from pollution, this seemed almost incredible; but some years before it had been ascertained that the water from a stream on the other side of the mountain found its way through when the brook was used for irrigating the land. It transpired that on the farm where this brook ran typhoid fever had been raging, and the excrements of the patients were emptied into the stream. Shortly after the outbreak the stream was used for the purpose of irrigation, and, as before, the water found its way underneath the mountain—(probably an old moraine from the glacial epoch)—and became mixed with the drinking supply of the village of Lausen. Ingenious experiments were tried in order to prove the fact of the water running under the mountain, and, after finding that this was undoubtedly the case, $2\frac{1}{2}$ tons of flour was mixed with the stream for the purpose of discovering whether the water simply run through a subterranean channel or filtered through porous material. Not a trace of the flour passed through with the water, showing conclusively that the filtration must be very effective, since the water was free from the minute granules of starch, present in the flour used in the experiment. Yet this filtration, efficient though it was, did not remove the specific poison of the disease" It would take unnecessary space to quote further examples but that given, among others, proves that water contaminated with sewage may, as the Lausen water was, be drank for years with impunity, provided no specific germs of disease were present, and in the same manner a well water in a town may consist largely of the soakage from sewers or cesspools and yet not give rise to disease for an indefinite period; but once let infected sewage soak into the well and there is no telling how serious the consequences may be. Moreover, a great danger exists continually that infected sewage may travel to long distances, in porous substrata like that under Cardiff, or the specific poison may be conveyed in

the sewers and become diffused into a well situated at a considerable distance from the point where the infected sewage entered the drains.

Since, therefore, the specific poisons of zymotic diseases are not removed by active filtration and elude detection, as they do, by the most rigid chemical and microscopical analysis, any water, however clear, inodorous and tasteless it may be, should be condemned if it gives decisive evidence of sewage contamination, apart from any consideration respecting the minuteness of the quantity of organic matter actually present. From the foregoing, it will also be seen that the fact of a water being used for dietetic purposes with impunity for some time previously, is no guarantee that it may be so used constantly for any subsequent period.

CARDIFF LABORATORY.

RESULTS OF ANALYSES OF SAMPLES OF WATER, expressed in parts per 100,000.

By J. W. THOMAS, F.C.S.

Number of Sample.	Total Solid Impurity.	Albuminoid Ammonia	Free Ammonia	Nitrogen as Nitrates and Nitrites.	Previous Sewage or Animal Contamination.	Chlorine.	Sulphates	Magnesia Salts.	Hardness.			Remarks.
									Temporary.	Permanent.	Total.	
1.	113.2	·011	0	5·770	57,380	6·95	excessive.	excessive.	10·5	38·9	49·4	Nearly clear
2.	84·0	020	·018	3·609	35,770	8·45	ditto	moderate.	5·5	29·2	34·7	Very turbid, with suspended matter
3.	90·6	·008	0	4·440	44,080	6·90	ditto	excessive	14·3	30·6	44·9	Nearly clear
4.	76·4	·009	·004	3·633	36,010	8·60	ditto	moderate.	4·1	27·8	31·9	ditto
5.	71·2	·007	·001	1·235	12,030	5·80	ditto	ditto	10·8	27·3	38·1	ditto
6.	83·2	·006	0	2·351	23,190	8·45	ditto	excessive.	6.1	35·6	41·7	ditto

THE FOOD SUPPLY.

In the Report made to your Board, in 1878, I directed your attention to the diseases of animals which render their flesh unfit for food, and I divided these diseases into three classes, as follows :—

1. Those diseases which undoubtedly render the meat unfit for the food of man.

2. Those diseases which depreciate the quality of the meat or make it preternaturally liable to decompose, but which do not necessarily, except in their later stages, render the meat unfit for the food of man.

3. Those diseases which do not necessarily depreciate the quality of the meat, or increase its liability to decomposition, and rarely render the meat unfit for the food of man.

With regard to those diseases embraced in the first class I would specially refer to pig typhoid or swine fever. This is a disease essentially one of blood poisoning, and I believe that the flesh of an animal suffering from typhoid, in one or all its stages, would necessarily be dangerous for food. In its peculiarly infectious character, as also in the *post-mortem* appearances, it is very analagous to typhoid fever in the human subject, and I would add my testimony to corroborate the strong opinion given by Dr. Budd, that the diseases are identical. Among others, the following instances may be quoted in support of the truth of the preceeding. On the evening of the 26th May, 1879, the S.S. "Rheola," from America, arrived in the Roath Basin, Cardiff, with 472 pigs on board. On inspection they were, apparently, in good condition, but an inquiry elicited the fact that several pigs had died during the voyage. On the 28th,—two days after they arrived in port,—six showed unmistakable symptoms of typhoid, and were destroyed; on the 30th three others were condemned, and on the 31st another pig was found to be suffering from swine fever. On the 2nd of June three others were destroyed, on the 3rd two, and on the 5th one,—making a total of 16. On the 28th, with the exception of those destroyed, all the others appeared to be healthy, and in no instance did the pigs, which were dealt with subsequently, give any indications on the previous days when the others were detected and caused to be slaughtered. The progress and development of the disease convinces me that had not the whole of

the herd been slaughtered they would have succumbed to the infection. From time to time pig typhoid has manifested itself in certain districts in this county. A butcher at Hafod purchased two pigs at Pontypridd market. The next day he observed that they were sick, and, as they continued to grow worse, he caused them to be returned to the seller. In a few days typhoid broke out among his own pigs which he had on his premises for some time previous, the result being that, excepting one which was slaughtered for food, the whole of his herd, numbering eighteen, had to be destroyed.

The *post-mortem* appearances were very similar to those which are found to occur in the typhoid of man. A careful *post-mortem* examination of the sixteen pigs brought over by the "Rheola" was made. An examination of the skin of the animals revealed the presence, in many instances, of a rash analagous to the rose-colour spots which are frequently found in the human subject suffering from typhoid. The colour of the spots cannot be as well observed, especially upon black pigs, but it is certainly very similar. Upon others there was intense scarlet efflorescence. On examining the intestines the mucous lining was very hyperœmic (congested with blood) and most of the carcases had ulceration of Peyer's glands.

Among the diseases belonging to class 2, the rot in sheep (fluke disease), caused by the presence of the entozoon (distoma hepaticum), which destroys the liver, chiefly claims attention. The course of this disease may be divided into two stages. In the first, the fluke (distoma hepaticum) may have infested the liver of the animal, but, owing to the strong constitutional powers which it may possess, does not appear to disturb the general good health of the sheep. In this condition the flesh of the animal if slaughtered may be considered by the Hygieinist sound (with the exception of the liver), and is to all appearances healthy. The meat is normal in character, and as far as can be determined the disease has been confined to the liver and the animal has not suffered constitutionally. That this is actually the case seems to be borne out by the observations of agriculturists, who affirm that in the first stage of the disease sheep lay on flesh well, and not a few are of opinion that they fatten more rapidly during this period. When, however, the flukes have destroyed the structure of the liver in such a manner that it ceases to perform its functions the animal becomes sick and dejected, and the usual characteristic symptoms of blood-poisoning results. The appearances of the carcase of sheep which have been slaughtered during the second stage show conclusively that very active constitutional disturbances have been at

work. The meat no longer possesses its normal nutritious value, and the more solid albumin and fatty constituents appear to be wanting. This is shown by the soft condition of the flesh, which bears the appearance of having been washed while warm. The carcass is very attenuated—the flesh loses its characteristic redness and becomes very pale, while the fat is wet, soft and glistening. The flesh of the animal slaughtered during the second stage of the disease is totally unfit for food, and your Inspector, acting under my instructions, gives his attention to the detection of mutton possessing the characteristic appearances resulting from fluke disease, which, if found, is seized and an order obtained for it to be destroyed.

ARTIZAN'S DWELLINGS.

In this Report the artizan's dwellings call for little observation. I referred on a former occasion to the fact that the houses are larger than those usually found in urban districts, but from causes before specified, they were frequently overcrowded. Now, however, this evil is much less prevalent than heretofore, a circumstance due to the careful and constant surveillance of your two Sanitary Inspectors, and I am of opinion that, on the whole, they are in a fairly satisfactory condition. It has been found necessary only in a few instances to condemn any as unfit for human habitation.

THE POPULATION.

The mean estimated population of the Urban Sanitary District of Cardiff, for the year 1879, is 81,500. This estimate is based on the total number of inhabited houses according to a survey made in the month of December last, by your two Inspectors of Lodging-houses at my request. The average number of inmates being estimated at 6·85 for each house, as was found to be the case in the census years 1861 and 1871. By a somewhat similar process, the average number of seamen is estimated. A return of the total registered tonnage entering the port during the year was obtained from the Customs Authorities, and the same proportionate number of seamen allowed as in the two years referred to.

The population for each sub-district is estimated as under :—

Sub-district of Cardiff, inhabitants (proper)	...	38,925
Average number of seamen in the Port	...	6,945
Sub-district of Roath, inhabitants	...	22,143
Sub-district of Canton, inhabitants	...	13,487
Total ...	...	81,500

MARRIAGES.

The number of marriages which took place in Cardiff in 1879 was 836. This number is in excess of the three previous years, but is below the year 1875. A similiar diminished rate since 1875 has been yearly observed throughout the kingdom, and is considered by the Registrar General, as due to the depressed state of trade and commerce of the country.

The yearly returns of marriages for five years, ending 1879, was as under :—

1875	...	841
I876	...	746
1877	...	811
1878	...	721
1879	...	836

BIRTHS.

The births in the Urban Sanitary District of Cardiff during the year 1879, were 2,969, registered as under :—

	Males.	Females.	Total.
Sub-district of Cardiff ...	777	708	1,485
,, of Roath ...	503	510	1,013
,, of Canton ...	243	228	471
	1,523	1,446	2,969

The birth-rate of the whole district has been 36·4 per 1,000. The total population includes the 6,945 seamen, whose families reside elsewhere, and who do not contribute to the birth-rate. When calculated on the population proper of the district, exclusive of seamen, it would be 39·7 per 1,000. The average birth-rate of the kingdom during the year was 35·1 per 1,000.

DEATHS.

The deaths during the year were 785 males and 643 females, making a total of 1,428. These were registered throughout the district as follows :—

	QUARTER ENDING	DEATHS.
Sub-district of Cardiff ...	March	239
	June	216
	September	203
	December	247
	Total	905
Sub-district of Roath ...	March	102
	June	80
	September	66
	December	92
	Total	340
Sub-district of Canton ...	March	61
	June	52
	September	33
	December	37
	Total	183

The death-rate was 17·5 per 1,000 inhabitants; this shows a gradual and progressive decrease in the mortality of the district, and is the lowest rate on record for any year since the Health of Towns' Act, 1848, come into operation, as will be seen by the subjoined table :—

TABLE No. .

Years.	Births.	Deaths.	Excess of Deaths over Births.	Excess of Births over Deaths.	Death-rate per 1000 Population.	
1848	428	579	151	...	35·3	
1849	466	864	398	...	54·0	
1850	504	485	...	19	28·6...	Sanitary Inspectn. Lodging-houses.
1851	575	525	...	50	28·6	
1852	696	620	...	76	28·6	
1853	865	644	...	221	26·8	
1854	950	925	...	25	34·9	
1855	1079	641	...	438	21·7...	1855, first portion of present system drainage used
1856	1227	772	...	455	22·1	
1857	1367	883	...	484	23·2...	1857, first main of present water supply used.
1858	1356	753	...	603	20·3	
1859	1336	826	...	510	22·3	
1860	1246	662	...	584	18·9	
1861	1223	837	...	386	23·9	
1862	1268	695	...	573	19·4	
1863	1302	862	...	440	23·9	
1864	1399	932	...	467	25·5	
1865	1382	867	...	515	23·4	
1866	1331	882	...	449	23·5	
1867	1397	873	...	524	23·5	
1868	1387	843	...	544	22·5	
1869	1414	1005	...	409	26·2	
1870	1406	903	...	503	23·2	
1871	1391	891	...	500	22·5	
1872	1358	916	...	442	22·6	
1873	1430	995	...	435	21·3	
1874	1550	885	...	665	23·5	
1875	2716	1547	...	1169	21·2	
1876	2707	1455	...	1252	19·1	
1877	2772	1475	...	1297	19·1	
1878	2795	1468	...	1327	18·5	
1879	2969	1428	...	1541	17·5	

* In 1849 the town was visited with a severe epidemic of cholera, and again in 1854.

The following table shows the death-rate of Cardiff in 1879, as compared with the death-rate during the same period of the 39 districts and sub-districts comprising chief towns; the remaining districts and sub-districts comprising chiefly small towns and country parishes; and also the average death-rate of the Kingdom:—

	Quarters ending—				
	March.	June.	Sept.	Dec.	
Cardiff	19·7	1·70	14·8	18·4	17·5
39 districts and sub-districts comprising chief towns ...	26·6	21·6	17·5	23·8	22·4
The remaining districts and sub-districts, comprising chiefly small towns and country parishes	23·2	20·3	14·7	18·0	19·0
Average death-rate of the whole Kingdom	25·2	21·1	16·4	21·4	21·0

This table shows that the mortality of the Cardiff Urban Sanitary District was 4·9 per 1,000 less than that of the chief towns, 1·5 per 1,000 less than that of the small towns and country parishes, and 3·5 per 1,000 less than that of the average of the whole Kingdom.

Contrasting the death-rate of Cardiff with that of the average of the Kingdom, we have to multiply 81,500 by 3·5 per 1,000, and this shows that the deaths in Cardiff were 284 less than they would have been had those in 1879 been as high as the average rate of the Kingdom.

DEATHS AT AGE.

The deaths at age were:—

Under one year	385
One and under five	197
Five and under fifteen	67
Fifteen and under twenty-five	99
Twenty-five and under sixty	448
Sixty and upwards	232
Total	1,428

The deaths under one year of age were at the rate of 129 per 1,000 births; that of the average of the Kingdom being 137; and of the twenty typical large towns, enumerated by the Registrar-General, 150. This is highly satisfactory, as it may fairly be taken that in any district where there is found a high rate of infant mor-

tality that it indicates defective sanitary arrangements, and is an illustration of the truth of the remark made by Dr. Simon, the late Medical Officer of the Privy Council, who said: "Those places where infants are most apt to die are necessarily the places where the survivors are most apt to be sickly." These words occur in the introductory preface to a very valuable report, made by Dr. Headlam Greenhow to Parliament, "On the Sanitary Condition of the People of England."

GENERAL MORTALITY.

The following table gives a classification of the causes of death as registered in the three sub-districts of Cardiff, with the proportionate death-rate in each class with its respective district :—

	CARDIFF.		ROATH.		CANTON.	
	Deaths.	Deaths per 1,000 Inhabitants.	Deaths.	Deaths per 1,000 Inhabitants.	Deaths.	Deaths per 1,000 Inhabitants.
Zymotic Disease	112	2·4	60	2·7	13	0·9
Constitutional ,,	160	3·2	61	2·7	36	2 6
Local ,,	445	9·8	163	7·3	90	6·6
Developmental,,	108	2·3	46	2·0	34	2·5
Violent ,,	80	1·7	10	0·4	10	0·7
Total.....	905	19·7	340	15·3	183	10·2

In the appendix a table will be found which gives a classification of diseases, with registered cause of death in each class, the ages at death, and the proportionate death-rate in Cardiff for 1879, as compared with the average death-rate of the Kingdom, extending over 25 years.

In accordance with instructions from the Local Government Board, I have compiled two other tabular forms. A—giving a table of deaths during the year 1879, of the Urban Sanitary District, classified according to disease, ages, and localities, with the population, and the births; and form B, illustrating the mortality and sickness of the district. In A, certain diseases are distinguished as being more or less influenced by, and amenable to Sanitary provisions; but there are certain of these which the Registrar General calls the seven chief zymotic diseases, comprising, small pox, measles, scarlatina, diphtheria, croup, whooping cough, and fever; and to these I would especially direct your attention. The following classification shows the deaths from these diseases for the year, with their proportionate death-rate, as compared with the preceding ten years ending 1878.

CARDIFF URBAN SANITARY DISTRICT.

TABLE showing the number of Deaths from the seven principal Zymotic Diseases, in the 10 Years, 1869 to 1878, and in the Year 1879.

Years ..... / Population.. / DISEASES.	1869 / 38,220	1870 / 38,878	1871 / 39,536	1872 / 40,431	1873 / 41,326	1874 / 42,221	1875 / 72,760	1876 / 74,741	1877 / 76,981	1878 / 79,073	Ten years average ending 1879. / 54,416	Death-rate per 1000 Population.	1879 / 81,500	Death-rate per 1000 Population.
nallpox	4	...	13	55	8	2	1	1	3	1	9	·16	...	...
easles	17	5	4	69	2	52	4	8	126	3	29	·55	10	·12
arlet Fever ...	50	26	90	15	4	13	132	201	30	10	57	1·04	44	·54
phtheria	11	2	1	2	6	6	11	10	1	12	6	·11	9	·11
hooping cough	33	29	1	20	19	12	38	25	40	70	29	·53	20	.25
ever	26	40	28	38	27	33	38	25	96	28	32	·58	21	·26
arrhœa	15	31	21	35	37	36	70	69	19	74	41	·75	32	·39
Total	156	133	158	234	103	154	294	339	255	198	203	3·72	136	1·67

N.B.—In 1875, the Cardiff Urban Sanitary District was formed, and in addition to the old Urban District of Cardiff, it took in the suburban districts of Roath and Canton.

The first of this class is *smallpox.* There has been no death or case of sickness from smallpox reported to me during the year, nor has the disease appeared as an epidemic since 1871-72. After these years, the cases of smallpox in Cardiff have been simply such as were imported either from foreign, or from other English ports or towns. When such have occurred, the sick have been immediately removed to the Hamadryad Seamen's Hospital. A large number of vessels yearly arrive here direct from London, where smallpox has prevailed for some time, and in view of the danger of the introduction of the disease I have made it my duty to visit and examine the children in many parts of the district, especially in the localities near the Docks. I have also from time to time examined the books of the Vaccination Officer and the Public Vaccinator so as to satisfy my mind of the efficiency of vaccination carried out in the district, and the results have been satisfactory.

Measles—Amongst the infantile diseases of children the mortality from measles has been very light—the total deaths were 10, and were at the rate of ·12 per 1,000 inhabitants, that of the Kingdom on an average of twenty-five years being ·42. The deaths took place in the following order, one in June, one in July, one in October, one in November, and six in December. The mortality from measles is always more severe when the epidemic prevails during the cold months—atmospheric influences then operating so as to produce the complications resulting in acute inflammatory affections of the respiratory organs.

Scarlatina—The mortality from scarlatina was 44, and was at the rate of ·54 per 1,000 ; that of the Kingdom on the average of the twenty-five years being 1·03,—the death-rate in this district is therefore only half that of the Kingdom. The epidemic appears to have been confined entirely to the Cardiff and Roath sub-districts, as no death was registered in the Canton sub-district during the whole of the year. The mortality was distributed over the year as follows, the deaths were in January, four in Cardiff and one in Roath ; February, one in Roath ; March, two in Cardiff and one in Roath ; April, five in Cardiff ; May, three in Cardiff ; June, three in Cardiff and one in Roath ; July, three in Cardiff and one in Roath ; August, two in Cardiff and two in Roath ; September one in Cardiff and one in Roath ; October, one in Roath ; November, two in Cardiff and four in Roath ; December, one in Cardiff and five in Roath. There is no infectious disease which to my mind offers such difficulty in the application of sanitary provisions as scarlatina. This difficulty arises from the circumstance that the poisonous germs of the disease are so

freely eliminated by the skin during the process of desquamation, and from mucous membranes during the act of breathing, as well as by the excreta. Owing to these sources the atmosphere of the chamber or dwelling is completely saturated with the "materies morbi" of scarlatina. Isolation is almost impossible in the family of the working man, owing to limited house accommodation. The sanitary measure I adopt are the following: I place myself in communication with the head of the family, the occupier of the house, or the private practitioner in charge of the case. The usual and ordinary means to prevent the spread of the disease during the progress of the case is adopted, but I lay great stress on the necessity of placing disinfectants in all vessels used to receive excreta, and after the chamber ceases to be occupied I direct your Inspector of Lodging-houses to disinfect the room in the following manner: he first fumigates the house by burning one pound of sulphur to every 1,000 cubit feet of space, and afterwards subjects it to the action of chlorine gas, evolved by mixing sulphuric acid with peroxide of manganese and chloride of sodium. The walls and floors are afterwards washed with water containing carbolic acid, carbolate of lime, or "sanitas" powder. When permission is obtained the clothes and bedding of the patient are conveyed to your disinfecting chamber and exposed to the action of dry air, raised to a temperature exceeding 240deg. I believe this all important, as I am convinced that washing clothes, before the organic matter with which they are tainted has been destroyed, is a means of spreading the infection. I also give instructions to the head of the family, or the occupier of the infected house, not to allow any child to attend school, and the schoolmaster is advised of the fact that scarlatina exists in that dwelling.

Diphtheria—the deaths from diphtheria during the year were 9, of these 6 were in the Cardiff and 3 in the Roath sub-districts. The deaths were at the rate of ·11 per 1,000 that of the Kingdom on an average of 15 years ·17 per 1,000. The death-rate from diphtheria in this district is therefore less than that of the Kingdom generally, and so far, satisfactory; but inasmuch as it is a disease due to blood poisoning, the excitant cause is attributable to defective sanitary arrangements, and is so seriously fatal in its results, and so thoroughly infectious, that it deserves the serious consideration of your Board.

In all cases coming under my observation, I have little difficulty in tracing their source to sewage contamination, and this contamination has been introduced into the system, either by the air, we breathe, or the water we drink. I will now illustrate these facts by some

selected typical cases out of many. Recently my attention was called to four cases of diphtheria in two houses situated in Tredegarville. In visiting both these houses, I experienced a strong smell of sewer gas, and on examination, I found in either house that the soil pipe from the water closet passed through the pantry to the main sewer. One of the joints of each series of pipes was defective, and permitted the escape of sewer gas. At another house in Park Place, in which a case of diphtheria had been reported to me, I found on examination, that the sanitary arrangements appeared perfectly satisfactory, the water closet was roomy, and the pan contained the usual quantity of water. On raising the handle to permit the escape of the effluent water, some seconds intervened before the influent water could enter the pan, and during this interval, a large quantity of sewer gas escaped. The room became very offensive, and the same smell pervaded the passage leading to the water closet. On further enquiry, the occupier mentioned that this was a source of constant annoyance, but unfortunately no means had been taken to remedy it. At another house in Windsor Place, my attention was called to a child suffering from diphtheria, and on entering the basement floor, there was a strong smell of sewer gas. I there found that the soil pipe passed through one of the chambers, and that a joint of the pipe was defective, and permitted the evolution of foul gases, and during the night sewage matter escaped through the opening into the chamber. These are instances of diphtheria occasioned by breathing air contaminated with sewer gas.

The following facts illustrate that the disease has been occasioned by the use of water polluted by sewage contamination. My attention was directed by the medical gentleman in attendance to some cases of diphtheria in a farm house in the neighbourhood of Cardiff. The house was of recent construction, and its arrangements were highly satisfactory, but the cases were numerous, and two being fatal out of five, I caused the water supply to be examined. The results of analysis revealed the presence in the water of considerable sewage contamination. The well was situated in the lowest part of the premises, probably selected as the spot where the water could be more easily obtained, and therefore economical in sinking the well. Near to this well was the cesspool, the soakage from the farmyard, and the surface drains all conveyed to this spot. The circumstance was reported to the Rural Sanitary Authority, and an order was given prohibiting the use of the water for drinking purposes, but unfortunately the well was not peremptorily closed. Within a few days three other cases of diphtheria were reported to me, one near Adamsdown, one in Tredegarville, and one in the Bute Road. The absence of any apparent excitant cause induced me to enquire into the milk supply.

I then learned that the milk was obtained by each of the three families from the farm house to which I have referred. On enquiry, I found that the tins used to convey this milk to town had been washed daily by the water obtained from the prohibited well. I have, therefore, every reason to believe that the germs of the disease were conveyed in this way, hence the necessity that the well should be peremptorily closed in all cases where well water is found to be polluted by sewage contamination, however minute.

Whooping Cough—the deaths from the infantile epidemic whooping cough, were 20; the average death-rate was ·25 per 1,000; that of the Kingdom, an average of 25 years being ·54. The deaths from whooping cough this year have been less than any previous year since the formation of the Urban Sanitary District, and is less than half the average annual mortality from whooping cough of the Kingdom during the past year.

Fever—The total number of deaths from fever during the year were 21, the death-rate being ·26 per 1,000, that of the Kingdom, on an average of 25 years being ·66 per 1,000. Of the 21 deaths, 5 were under the age of 5 years, and therefore infantile, and the total deaths, namely, 21, had been less than any previous year of the ten years, according to table—p. 24, and can be deemed but exceedingly satisfactory. They were distributed over the sub-districts thus, 14 in Cardiff and 7 in Roath.

Diarrhœa—The deaths from diarrhœa were 32, the death-rate was ·39 per 1,000, that of the Kingdom on the average of 25 years being ·89. Of the 32 deaths, 26 were under the age of one year, these were simply infantile, and others were under the age of 5 years, and only 1 was an adult. 20 deaths from diarrhœa were registered in the sub-district of Cardiff, 9 in Roath, and 3 in Canton. The deaths chiefly occurring at an age when the natural food is milk, it is highly important in all cases to ascertain the quality thereof, as on several occasions when I have had a microscopical examination made, I have found that the milk contained colostrum. When this is the case, it indicates that the cow from which the milk has been obtained, has recently calved. For the first few days the milk contains so large a quantity of colostrum, that is perfectly unfit for use, and during the whole of the first month, there is sufficient present to make it an undesirable article of diet for children, and very likely, when so taken, to produce diarrhœal symptoms. This circumstance is confirmed by the fact that infantile diarrhœa is very prevalent during the summer months and the calving season. Subjoined is a tabular statement of the localities and streets in which deaths from the seven chief zymotic diseases have occurred.

CARDIFF.

Name of Street.	Measles.	Scarlatina	Dip'theria	W. Cough	Fever.	Diarrhœa
Augusta Street.....	1	1	...	...	...	...
Adam Street.....	1	...	...	...	...	...
Sophia Street	1	1	...	...	...	...
Hodge's Row	1	1	...	...	...	...
Canal Parade	1	...	...	...	...	...
Christina Street	1	3	...	...	...	1
Alice Street	...	1	...	...	...	...
David Street	...	1	...	2	...	...
Moira Terrace	...	1	1	...	...	...
Victoria Street.....	...	1	...	...	...	...
Pellett Street	...	1	...	...	...	...
Winstone's Court.....	...	1	...	...	...	...
Wharton Street	...	2	...	...	...	...
Richmond Road	...	2	...	...	...	...
Garth Street	...	1	...	...	...	...
Duffryn Street.....	...	2	...	...	...	...
Herbert Street.....	...	1	...	1	...	...
Kettle's Court	...	1	...	...	...	...
Bridge Street	...	2	...	...	...	...
Tyndall Street.....	...	1	...	2	...	...
Bradford Street	...	1	...	...	...	...
Upper George Street..	...	1	...	1	...	...
James Street	...	...	1	...	...	...
Edward Street.....	...	...	1	...	...	...
Roath Road	...	...	1	...	...	...
Northcote Street	...	...	1	...	...	...
St. Andrew's Crescent	...	...	1	...	...	...
Bute Street	...	...	...	...	...	2
Oakfield Street.....	...	...	...	1	...	...
William Street.....	...	...	...	1	...	...
Frederica Street	...	...	...	1	...	...
Mary Ann Street.....	...	...	...	1	2	...
Castle Street	...	...	...	1	...	...
Ebenezer Street	...	...	...	1	...	...
North William Street	...	...	...	...	2	...
Moira Street	...	...	...	...	1	...
Canal Bank	...	...	...	...	1	...
Workhouse	...	...	...	...	2	3
Wood Street	...	...	...	...	1	1
Dudley Terrace	...	...	...	...	1	...
Hospital Ship	...	...	...	...	2	...
Sandon Place	...	...	...	...	1	...
Maria Street	...	...	...	...	1	...
Park Place	...	...	...	1	...	...
Millicent Street	...	...	...	...	...	1
Davis Street	...	...	...	...	...	1
Howard Street.....	...	...	...	...	..	1

Name of Street.	Measles.	Scarlatina	Dip'theria	W. Cough	Fever.	Diarrhœa.
Brook Street	...	...	...	...	...	1
Buzzard Street	...	...	...	...	...	1
Westbourne Place ...	...	...	...	...	...	1
Catherine Street	...	...	...	...	...	1
Flora Street.....	...	...	...	...	...	1
Russell Street.....	...	...	...	...	...	1
Ellen Street.....	...	...	...	...	...	1
Letty Street	...		...	...	...	1
Havelock Street	...	...	...	...	...	1
Bedford Street.....	...	...	...	...	...	1
ROATH.						
Topaz Street	1	...	...	2	...	...
Oxford Street	1	...	...	...	...	...
John Street	...	4	...	...	4	...
Richards Terrace.....	...	1	...	...	...	...
System Street	...	1	...	...	...	...
Shakespeare Street ...	...	2	...	..	...	...
Milton Street	...	1	...	...	...	...
Pearl Street.....	...	1	...	...	...	...
Clive Street.....	...	1	1	...	...	..
Grenville Terrace.....	...	1	...	...	...	...
Clifton Street	...	2	...	...	...	...
Hellen Street	...	1	...	...	...	...
Eclipse Street	...	1	1	...	...	...
Emerald Street	...	1	...	...	...	...
Stacey Road	...	...	1	...	...	...
Sapphire Street	...	...	...	...	...	2
Ruby Street.....	...	...	...	...	1	1
Galston Street.....	...	...	...	...	...	1
Lead Street	...	...	...	...	...	1
Elm Street	...	...	...	...	...	1
Prince Leopold Street	...	...	...	...	1	1
Cecil Street	...	...	...	...	...	1
Croft Street.....	...	...	...	...	..	1
Penylan	...	...	..	1	...	...
Planet Street	...	...	...	1	...	...
Broadway	...	...	...	...	1	.
Platinum Street	...	1	...	...	...	...
CANTON.						
Albert Road.....	1	...	...	...	...	...
Llandaff Road	1	...	...	..	...	...
Wellington Street ...	...	...	..	2	...	...
Pontcanna Terrace ...	...	...	...	1	...	...
Picton Place	...	...	..	...	...	1
North Morgan Street.	..	...	...	...	...	1
Harvey Street	...	...	...	...	...	1

Constitutional Diseases—It will be seen from the table on p. 23, that the ratio of deaths registered under this title, differs appreciably in the three sub-districts of the Borough. In Cardiff sub-district the proportion is 3·2, in Roath, 2·7, and in Canton 2·6 per 1,000 inhabitants respectively. At first sight, it would appear that the salubrity of the Cardiff sub-district was at fault, but this is not in reality the case. In this portion of the town the total population of 38,000, includes 10,000 Irish; whilst in Roath there are 2,000, and in Canton 1,000. These, by reason of limited house accommodation, and consequent vitiated atmosphere, and the parents, from want of means, being unable to afford sufficient nutritious diet and care to their offspring in early life such as would develop constitutional powers to resist disease, suffer in proportion to their condition. Under these circumstances diseases as tuberculosis (strumous disease) for instance, occur, and the death-rate is greater in those districts where they congregate in greatest numbers. If the proportion of Irish inhabitants above given be taken into consideration, it will become manifest that the facts just alluded to, account for the apparent anomaly that the death-rate from constitutional diseases is greater in Cardiff than in either of the two other sub-districts, and greater also in Roath than Canton.

Local Diseases—The early and later months of the year were characterised by extremely severe and trying weather, as previously mentioned, and during these periods, the death-rate from local diseases was naturally high. With the exception of these circumstances, anything requiring special notice does not manifest itself.

Developmental Diseases—There is no necessity for any explanation with regard to the diseases embraced under this title. The low rate of mortality has already been referred to.

Violent Deaths—The number of deaths from violent causes is large, and in excess of other towns of the Kingdom. When the dangers to be apprehended from railway terminals, coal tipping, &c., as well as the liability to drowning afforded by the docks, canals, &c., are contemplated, it will be noted that Cardiff is a town peculiarly circumstanced for the frequent occurrence of deaths from violent causes.

The following is a summary of the Sanitary duties discharged during the year —

9,902 day, and 2,193 night visits were made by the Inspectors of Lodging-houses, and reported to your Medical Officer of Health.

409 houses were reported as overcrowded, and action taken.

408 houses found to be in a filthy condition were ordered to be cleansed and limewashed.

Lime brushes, and other necessary articles for cleansing and purifying houses were lent to occupiers on 645 occasions.

81 houses were disinfected after fever and other zymotic diseases, as also the bedding and clothes belonging to the sick.

9 houses were reported as unfit for habitation, being in a dilapidated condition. These were dealt with by proceedings before the Magistrates.

375 house and surface drains in a defective state were remedied.

136 cesspools were emptied in accordance with Bye Laws.

1 cesspool having been emptied by owner contrary to the requirements of the Bye Laws, proceedings were taken and the offender convicted.

The cesspools belonging to 69 houses were connected with the main sewer.

64 animals ascertained to be kept in an improper state, notices were served on owners to abate the evil.

The owners of 147 cowsheds, found to be in a filthy state (or overcrowded) were ordered to abate the nuisance.

339 accumulations of house and refuse matter near dwellings were ordered to be removed.

16 wells were peremptorily closed by order of the Magistrates, the water being polluted and unfit for dietic or domestic purposes.

The owners of 32 houses without proper water supply were ordered to obtain the same from the Public Company.

30 carcases of pigs and 16 of sheep were destroyed by order of the Magistrates. The total weight of meat so disposed was 3,907 lbs.

In these several cases where proceedings were taken before the Magistrates, penalties, varying from 20s. to £10 with costs were inflicted.

I have now to direct your attention to the duties devolving on me as your Port Sanitary Medical Officer.

The subjoined table shows the number of vessels coastwise and foreign, yearly entering this Port, with their registered tonnage, from 1871 to 1879 inclusive :—

Year.	No. of Vessels Inwards		Total No. of Vessels Foreign and Coastwise.	Tonnage.		Total Tonnage Foreign and Coastwise Inwards.
	Foreign.	Coastwise.		Foreign.	Coastwise.	
1871	4,234	6,919	11,133	1,637,725	588,011	2,225,736
1872	4,942	6,994	11,836	1,957,897	600,805	2,552,702
1873	4,694	6,674	11,368	1,920,410	640,089	2,560,499
1874	4,966	6,213	11,176	2,113,987	545,692	2,659,679
1875	4,645	5,541	10,186	1,947,265	493,818	2,441,083
1876	5,511	6,957	12,468	2,367,307	601,240	2,963,547
1877	5,625	6,661	12,286	2,542,210	586,773	3,128,983
1878	5,867	7,138	13,005	2,821,409	613,845	3,335,254
1879	5,761	6,958	12,719	2,944,565	635,613	3,580,178

This table shows a marked and progressive yearly increase in the shipping trade of this Port.

Owing to the circumstance that the Docks of this Port open direct into the Bristol Channel, a large number of vessels arrive with each tide, with no intermediate station at which they can be moored for examination previous to entering the dock. This is an inconvenience not experienced at most other ports, and it is necessary to adopt special means for the purpose of ascertaining the health of the crews, and prevent the introduction of epidemic disease. These means are obtained through the co-operation of the following Officials—the Pilot, the Examining and Quarantine Officer, the rummaging Officer of the Customs, and the resident Medical Officer of the Hamadryad Seamen's Hospital. The Pilot acting under the instructions of the Pilotage Board, immediately on taking charge of a vessel, is required to ascertain if there had been any death or sickness during the passage, and to communicate the result to the Examining or Quarantine Officer, who on entering the vessel, puts the following questions to the Captain from a printed form :—

1 From what port do you come ?

2 Have you had any communication with another vessel during this passage ?

3 Is every person on Board in good health ?

4 Has any one died on Board during the voyage ?

5 Has anyone been ill, and if so m what disease has he suffered ?

The replies are written down, and the form signed by the Captain. If any sickness or death has occurred, the fact is immediately communicated to the Collector of the Customs, and by him transmitted to your Medical Officer, who is then required without delay, to visit the ship, and ascertain all the circumstances, past and present, connected with the health of the crew, and to report the result of such visit to the Collector. On visiting the ship, should there be any of the crew sick, the case has to be dealt with according to its exidency. Should the nature of the illness be serious, and the patient in a condition to admit of removal, he is conveyed to the Hamadryad Seamen's Hospital, and in the event of the disease being infectious, an inspection of the Log book is made. Afterwards, the whole of the crew are paraded on deck, and each personally examined as to his state of health. The ship is thoroughly disinfected and fumigated by your Port Sanitary Inspector, who takes charge of the bedding of the sick man, and conveys them to your disinfecting house, where, previous to washing, they are placed in a chamber, properly constructed for the exposure of fabrics to the action of dry air, heated to a temperature exceeding 240 degrees. If considered necessary, in order to prevent the spread of the disease to other crews, the Medical Officer makes arrangements with the Harbour or Dock Master, so as to cause the ship to be moored at a spot sufficiently distant from all others, and communication with the crew limited to the actual business requirements of the vessel.

The Rummaging Officer is instructed, while in the discharge of his duties, to notice if there are any sanitary defects in the arrangements of the vessel, or other matters calculated to prejudice the health of the crew. The Medical Officer of the Hamadryad Seamen's Hospital reports immediately when any case of infectious disease is admitted into that Institution, giving the name of the vessel from which the patient has been received Practically, all serious cases of sickness among the seamen are received into this Institution, and of a consequence, none can possibly escape the observation of your Medical Officer.

The Hamadryad Seamen's Hospital is an Institution capable of accommodating 60 in-patients, and is supported by voluntary subscriptions obtained from the shipping. All ships, on entering the port, are asked to contribute 2s. per 100 tons register, and by these means ample funds are obtained. The sick seamen from vessels without regard to nationality, are admitted, and treated free of charge.

The number of patients received into this Institution during 1879 was 461 ; of these, 221 were medical, and 240 surgical cases.

Among these, the following cases were reported to me :—

Cases of Fever	18
,, Diarrhœa	7
,, Ague	19
,, Scurvy	1
,, Dysentery	5
Total	50

During the year, 81 vessels, said to have sickness on board, were visited. 57 of these had patients on board suffering either from zymotic diseases, or diseases of this class had occurred during the voyage. The vessels were all disinfected in the manner I have described, the remaining 24 had simply diseases of an ordinary character on board, and did not require any special services to be rendered.

15 chests and 10 bags of clothes belonging to seamen who had died soon after leaving a foreign port were received from the Customs Authority, disinfected by your Port Sanitary Inspector, and returned to the Custom House Officer.

In concluding this report, it is with great satisfaction I refer to the co-operation I have at all times received from your Sanitary Inspectors, Messrs. James and Gover, and to testify to the zeal and ability with which they have discharged the important duties entrusted to them.

I have the honour to be, Gentlemen,

Your obedient Servant,

H. J. PAINE, M.D.,

Medical Officer of Health to Cardiff Urban Sanitary District, and Port Sanitary Authority

APPENDIX.

CARDIFF URBAN SANITARY DISTRICT.

Deaths registered at several groups of ages from Different Causes during the year 1879.

CAUSE OF DEATH.	AGES. 0 to 1	1 to 5	5 to 15	15 to 25	25 to 60	60 & upwds	Total.	Death Rate in Cardiff per 1000 Inhabitants, 1879.	Average Death Rate per 1000 Inhabitants of Kingdom, for 25 years.
CLASSES.									
I. Zymotic Diseases	62	69	20	10	21	4	186	2·282	5·038
II. Constitutional Diseases ...	27	32	17	30	137	14	257	3·153	4·205
III. Local Diseases	164	81	22	35	245	151	698	8·564	8·499
IV. Developmental Disease ...	114	8	1	3	6	56	188	2·306	3·551
V. Violent Deaths	18	7	7	21	39	7	99	1·215	·761
Total	385	197	67	99	448	232	1428	17·524	22·282
CLASS.									
I. ZYMOTIC DISEASES									
ORDER 1.—MIASMATIC									
1. Smallpox									0·250
2. Measles	1	8	1				10	0·122	0·428
3. Scarlet Fever (Scarlatina) ...	6	24	12	1	1		44	0·539	0·886
4. Diphtheria	1	7	1				9	0·110	0·117
5. Quinsy		2					2	0·024	0·016
6. Croup	3	4	1				8	0·098	0·240
7. Whooping Cough	7	13					20	0·245	0·514
(Typhus Fever				1	1		2	0·024	0·099
8. { Enteric or Typhoid Fever ...	1	4	2	5	6	1	19	0·233	0·331
(Simple continued Fever ...									0·176
9. Erysipelas	2					1	3	0·036	0·097
10. Puerperal Fever (Metria) ...					1		1	0·012	0·059
11. Carbuncle									0·011
12. Influenza									0·053
13. Dysentery					2		2	0·024	0·067
14. Diarrhœa	26	5		1	1		33	0·404	0·890
15. Cholera									0·119
16. Ague									0·007
17. Remittent Fever									0·015
18. Rheumatism			2	1	5		8	0·098	0·109
19. Other Zymotic Diseases ...	1		1	1			3	0·036	0·095
ORDER 2.—ENTHETIC.									
1. Syphilis	10				1	1	12	0·147	0·063
2. Stricture of Urethra									0·010
3. Hydrophobia									0·001
4. Glanders...									0·001
ORDER 3.—DIETIC.									
1. Privation									0·003
2. Want of Breast Milk	1						1	0·012	0·051
3. Purpura and Scurvy	1				1		2	0·024	0·018
4. Alcoholism { a. Del Tremens / b. Intemperance					2	1	3	0·036	0·028 / 0·017
ORDER 4.—PARASITIC.									
1. Thrush	2	2					4	0·049	0·055
2. Worms									0·006
Totals	62	69	20	10	21	4	186	2·282	5·038
CLASS.									
II. CONSTITUTIONAL DISEASES									
ORDER 1.—DIATHETIC.									
1. Gout									0·015
2. Dropsy					1		1	0·012	0·385
3. Cancer					27	8	35	0·429	0·369
4. Cancrum Oris (Noma)		1					1	0·012	0·007
5. Mortification					1		1	0·012	0·065
ORDER 2.—TUBERCULAR.									
1. Scrofula	6	5	2	4	2	1	20	0·245	0·142
2. Tabes Mesenterica	8	3				1	12	0·147	0·282
3. Phthisis	7	12	12	26	106	4	167	2·049	2·567
4. Hydrocephalus	6	11	3				20	0·245	0·370
Totals	27	32	17	30	137	14	257	3·153	4·205
CLASS.									
III. LOCAL DISEASES.									
ORDER 1.—NERVOUS SYSTEM.									
1. Cephalitis	3	3	3	2	1		12	0·147	0·198
2. Apoplexy				1	15	8	24	0·269	0·477
3. Paralysis				1	15	13	29	0·355	0·486
4. Insanity									0·030
5. Chorea				1			1	0·012	0·003
6. Epilepsy				1	6		7	0·085	0·114
7. Convulsions	84	19	2		1		106	1·300	1·265
8. Brain Disease, &c.	2	3	2	4	7	5	23	0·282	0·231
ORDER 2.—DISEASES OF CIRCULATION.									
1. Pericarditis				1	1	1	3	0·036	0·029
2. Aneurism					5		5	0·060	0·021
3. Heart Disease, &c.			2	6	59	37	104	1·309	0·899
ORDER 3.—RESPIRATORY ORGANS.									0·068
1. Laryngitis	46	32	4	7	37	48	174	2·134	1·596
2. Bronchitis					1	2	3	0·036	0·046
3. Pleurisy	18	18	3	4	32	10	85	1·042	1·163
4. Pneumonia					8	3	11	0·073	0·203
5. Asthma	1	1	2		6	2	12	0·147	0·195
6. Lung Disease, &c.									0·068
ORDER 4.—DIGESTIVE ORGANS.									
1. Gastritis						1	1	0·012	0·038
2. Enteritis									0·162
3. Peritonitis			1	3	1		5	0·060	0·077
4. Ascites					2		2	0·024	0·085
5. Ulceration of Intestines ...					1	1	2	0·024	0·045
6. Hernia					2	2	4	0·049	0·042
7. Ileus									0·059
8. Intussusception	1						1	0·012	0·014
9. Stricture of Intestines ...				1	5	1	7	0·085	0·013
10. Fistula									0·005
11. Stomach Disease, &c.	1				4	1	6	0·073	0·128
12. Pancreas Disease									
13. Hepatitis				1	1	2	4	0·024	0·069
14. Jaundice	3			1	1	5	10	0·060	0·069
15. Liver Disease			1		16	5	22	0·269	0·238
16. Spleen Disease					1		1	0·012	0·003
ORDER 5.—URINARY ORGANS.									
1. Nephritis	1						1	0·012	0·018
2. Ischuria									0·005
3. Brights' Disease (Nephria) ...		1	2	2	16	6	27	0·331	0·078
4. Diabetes					1	1	2	0·024	0·028
5. Calculus (Stone)									0·010
6. Cystitis				1		1	2	0·024	0·016
7. Kidney Disease					6	2	8	0·098	0·114
ORDER 6.—ORGANS OF GENERATION.									
1. Ovarian Dropsy									0·011
2. Uterus Disease									0·045
ORDER 7.—ORGANS OF LOCOMOTION.									
1. Synovitis, (Arthritis)									0·004
2. Joint Disease					1		1	0·012	0·073
ORDER 8.—INTEGUMENTARY ORGANS.									
1. Phlegmon	1	2					3	0·036	0·023
2. Ulcer									0·018
3. Skin Disease	3	1					4	0·049	0·015
Totals	164	81	22	35	245	151	698	8·564	8·499
CLASS.									
IV. DEVELOPMENTAL DISEASES.									
ORDER 1.—DISEASES OF CHILDREN.									
1. Premature Birth	44						44	0·539	0·604
2. Cyanosis	3						3	0·036	0·020
3. Spina Bifda	1						1	0·012	0·017
4. Other Malformations	1						1	0·012	0·020
5. Teething	5	3					8	0·098	0·206
ORDER 2.—ADULTS									
1. Paramenia						1	1	0·012	0·004
2. Childbirth (see Metria) ...				1	3	4	8	0·098	0·112
ORDER 3.—OLD PEOPLE.									
1. Old Age						55	55	0·674	1·373
ORDER 4.—NUTRITION.									
1. Atrophy and Debility	60	5			2		67	0·722	1·191
Totals	114	8	1	3	6	56	188	2·306	3·551
CLASS.									
V. VIOLENT DEATHS.									
1. Fractures and Contusions ...	3	2	2	1	17	2	27	0·331	0·304
2. Wounds. { Gunshot ... / Cut Stab ...					1		1	0·012	0·004 / 0·004
3. Burns and Scalds		2	1		1		4	0·049	0·107
4. Poison									0·011
5. Drowning			1	3	9	16	4	33	0·404	0·117
6. Suffocation	2						2	0·024	0·066
7. Otherwise				1			1	0·012	0·051
Order 3.—HOMICIDE							1	0·012	0·017
Order 4.—SUICIDE						2	2	0·024	0·010
Other Violent Deaths (not classed) ...	13	2		10	2	1	28	0·349	0·060
Totals	18	7	7	21	39	7	99	1·215	·761

Table of Deaths during the year 1879, in the Urban Sanitary District of Cardiff.

CLASSIFIED ACCORDING TO DISEASES, AGES, AND LOCALITIES, AND SHOWING ALSO THE POPULATION OF SUCH LOCALITIES, AND THE BIRTHS THEREIN DURING THE YEAR.

(1.) Names of Localities (being Parishes, Groups of Parishes, Townships, Wards, or other areas of known population) adopted for the purposes of these Statistics; public institutions being excluded.	Population at all Ages.		Registered Births.	Mortality from all causes, at subjoined Ages.							Mortality from subjoined causes, distinguishing Deaths in Persons under Five Years of Age.																					
	Census 1871.	Estimated to middle of 1879.		At all ages.	Under 1 year.	1 and under 5	5 and under 15	15 and under 25	25 and under 60	60 and upwards.		Smallpox.	Measles.	Scarlatina.	Diphtheria.	Croup (not "spasmodic").	Whooping Cough.	Continued Fevers. Typhus.	Enteric or Typhoid Fevers.	Continued Fevers. Puerperal.	Diarrhœa and Dysentery.	Cholera.	Rheumatic Fever.	Erysipelas.	Pyæmia.	Puerperal Fever.	Ages.	Phthisis.	Bronchitis, Pneumonia, & Pleurisy.	Heart Disease.	Injuries.	Other Diseases.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32	33.
District of Cardiff	Enumerated Persons in District not Resident.	82364	2969	1274	356	194	66	88	371	199	Under 5		9	30	8	7	20		5		27		7	2	1			19	112		24	286
											5 upwds.		1	14	1	1		2	10		4			1	1	1		157	128	97	60	269
Public Institutions. Infirmary				30		1	1	1	24	3	Under 5														1			2		3	11	1
											5 upwds.																					2
Hamadryad				14				2	12		Under 5								2			1					2	3	2	3	1
											5 upwds.																		12			
Union				109	28	2		8	41	30	Under 5								2		4							17	2		24
											5 upwds.																					41
Gaol				1	1						Under 5																					1
											5 upwds.																					
Totals				1428	385	197	67	99	448	232	Under 5		9	30	8	7	20		5		31		7	2	1			19	114		25	311
											5 upwds.		1	14	1	1		2	14		4		8	1	2	1		148	148	104	74	323

The estimated population of Urban District of Cardiff is based on total number of inhabited houses, and average number of inmates found to exist in each house at census 1861 and 1871.

Table of Mortality and Sickness in the Urban Sanitary District of Cardiff. 1879.

FOR THE TWELVE CALENDAR MONTHS ENDING DECEMBER 31ST, 1879.

[Area of District, 7,374 Acres.

NAME OF DISEASE.	(A) Deaths (among all classes) registered as having occurred in the District or Division.		(B) Sickness and Deaths among Paupers.				(C) If there be my Hospital or other Public Medical Institution in or near the District or Division, the subjoined columns are to be filled up.				
	Total Deaths registered as above, including those entered in columns IV. and V.	Deaths of Persons who have come into the District or Division with their fatal illness upon them.	Sickness and Deaths among out-door paupers; and among any paupers who belong to the District or Division, and have been received into the Workhouse on account of Disease; whether the Workhouse be within or without the District or Division.				IN-PATIENTS. Sickness and Deaths in such Institutions among inmates who belong to the District or Division.				OUT-PATIENTS. New cases of sickness among persons who belong to the District or Division, and are out-Patients of Hospitals or pedicals of Dispensaries.
			New Cases.		Deaths.		New Cases.		Deaths.		
	Aged under 5 years.	Aged 5 years and upwards.	Aged under 5 years.	Aged 5 years and upwards.	Aged under 5 years.	Aged 5 years and upwards.	Aged under 5 years.	Aged 5 years and upwards.	Aged under 5 years.	Aged 5 years and upwards.	Aged under 5 years.	Aged 5 years and upwards.
I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.
Small Fever														
Measles	9	1			9	5			2					
Scarlatina	30	14			10	16		1						
Diphtheria	8	1											5	2
Croup (not "spasmodic")	7	1												
Whooping Cough	20					2		1					12	5
"Continued" Fevers. Typhus		2												
"Continued" Fevers. Enteric	5	14			1	8	1			13		3		
"Continued" Fevers. Of other, or doubtful sort					1	37				8			10	15
Diarrhœa and Dysentery	31	4			29	47	1		15	22	4		6	11
Cholera														
Rheumatic Fever		8				10				29		1		3
Erysipelas	2	1				13				3		1		
Pyæmia	1	2								1				
Puerperal Fever		1												
Ages										10				
Phthisis	19	148				101		18	1	49		19	4	50
Bronchitis, Pneumonia, and Pleurisy	114	148			35	234	1	14		87		21	11	125
Heart-Disease		104				59		16		20		5		17
Injuries	25	74			28	120			6	277		13	9	379
DISEASES NOT NAMED ABOVE	311	323			80	1255	16	37	67	1400		59	135	3321
TOTAL	582	846			193	1901	19	87	91	1519	4	122	192	3919